

QWIP WITH ENHANCED OPTICAL COUPLING

ABSTRACT OF THE DISCLOSURE

[0067] A QWIP structure is disclosed that is configured with enhanced optical coupling to improve absorption capability and efficiency. A waffle-type light-coupling grating having a pattern of etched holes operates to improve absorption by preventing photons from bouncing out of the detector sensing areas. A post-type light coupling grating can also be used. Parameters of the grating, including its orientation, pitch, and etch depth, can be adjusted to optimize specific color detection. The grating can include a hybrid metal layer including both ohmic and reflective qualities to further improve quantum and conversion efficiency. A “photon-in-a-box” configuration is also disclosed, where sides of the QWIP sensing areas are coated with reflective metal to further inhibit the escaping of photons. The material design and number of quantum wells per QWIP can be selected so as to exploit the avalanche effect, thereby increasing device responsivity.